UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/393,463	09/10/1999	WILLIAM S. WOODS	899.009US1	2759

21186 7590 11/15/2006

SCHWEGMAN, LUNDBERG, WOESSNER & KLUTH, P.A.
P.O. BOX 2938
MINNEAPOLIS, MN 55402

EXAMINER	
CHAU, COREY P	

ART UNIT	PAPER NUMBER
2615	

DATE MAILED: 11/15/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/393,463	WOODS, WILLIAM S.	
	Examiner	Art Unit	
	Corey P. Chau	2615	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *09 August 2006*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-50* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *24,41-45 and 47-50* is/are allowed.

6)☒ Claim(s) *1-23, 25, 28-29, 34, 36, and 40* is/are rejected.

7)☒ Claim(s) *26,27,30-33,35,37-39 and 46* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.
> (e) the invention was described in a patent granted on an application for patent by another filed in the United States before the invention thereof by the applicant for patent, or on an international application by another who has fulfilled the requirements of paragraphs (1), (2), and (4) of section 371(c) of this title before the invention thereof by the applicant for patent.

The changes made to 35 U.S.C. 102(e) by the American Inventors Protection Act of 1999 (AIPA) and the Intellectual Property and High Technology Technical Amendments Act of 2002 do not apply when the reference is a U.S. patent resulting directly or indirectly from an international application filed before November 29, 2000. Therefore, the prior art date of the reference is determined under 35 U.S.C. 102(e) prior to the amendment by the AIPA (pre-AIPA 35 U.S.C. 102(e)).

2. Claim 1 is rejected under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6353671 to Kandel (hereafter as Kandel).

3. Regarding Claim 1, Kandel discloses a method of processing audio signals (i.e. signal processing circuit and method for increasing speech intelligibility), comprising inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter (Fig. 4; column 5, line 57 to column 6, line 5; column 9, lines 50-57) using a narrowband subaudible probe

signal (Fig. 4; column 6, lines 19-24; column 10, lines 12-25; column 12, lines 1-4).

4. Claims 1-2, 5-15, 17-18, 20, 22, 25, 28-29, 34, 36, and 40 are rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5506910 to Miller et al. (hereafter as Miller).

5. Regarding Claim 1, Miller discloses a method of processing audio signals, comprising inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter (Fig. 3; column 7, lines 9-19) using a narrowband subaudible probe signal (Fig. 1; column 4, line 64 to column 5, line 35).

6. Regarding Claim 2, Miller discloses a method of processing at least one audio signal comprising: filtering a processed signal by a notch filter to form a filtered signal (Fig. 1; column 4, lines 47-63); and sending a subaudible narrowband signal having a first bandwidth into the filter signal to form a probe signal to probe a feedback path having a second bandwidth (Fig. 1; column 4, line 64 to column 5, line 35).

7. Regarding Claim 5, Miller discloses sending the subaudible narrowband signal comprises sending the subaudible narrowband signal having a level, wherein the level of the subaudible narrowband signal is determined using an audibility model (Fig. 1; column 4, line 64 to column 5, line 35).

8. Regarding Claim 6, Miller does discloses sending the subaudible narrowband signal comprises sending the subaudible narrowband signal at a

level determined by an audibility model, wherein the audibility model has a criterion level, and wherein the level of the subaudible narrowband signal is adjusted so as to be is the criterion level of the audibility model (Fig. 1; column 4, line 64 to column 5, line 35).

9. Regarding Claim 7, Miller discloses wherein sending the subaudible narrowband signal comprises sending the subaudible narrowband signal at a level determined by an audibility model, wherein the audibility model has a criterion level, and wherein the level of the subaudible narrowband signal is adjusted so as to be is below the criterion level of the audibility model (Fig. 1; column 4, line 64 to column 5, line 35).

10. Regarding Claim 8, Miller discloses a system for enhancing audio signals, the system comprising:

at least one detector to detect undesired feedback in an input signal (Fig. 1; column 3, lines 32-60);

at least one notch filter to filter a processed signal, wherein the at least one notch filter provides a filtered signal (Fig. 1; column 4, lines 47-63) and the processed signal is provided by processing the input signal (Fig. 1); and

at least one probe generator to generate a probe signal and the filtered signal used to probe a feedback path with a narrowband subaudible audio probe signal (Fig. 1; column 4, line 64 to column 5, line 35).

11. Regarding Claim 9, Miller discloses the at least one detector determines when the feedback path will be probed (Fig. 1; column 3, lines 32-60).

12. Regarding Claim 10, Miller discloses the at least one detector determines a range of frequencies at which the feedback path will be probed (Fig. 1; column 3, lines 32-60).

13. Regarding Claim 11, Miller discloses the at least one detector provides a feedback parameter, and wherein the at least one notch filter is receptive to the feedback parameter from the at least one detector (Fig. 1; column 3, lines 32-60).

14. Regarding Claim 12, Miller discloses the at least one detector provides a plurality of feedback parameters, and wherein the at least one notch filter is receptive to the plurality of feedback parameters from the at least one detector (Fig. 1; column 3, lines 32-60).

15. Regarding Claim 13, Miller discloses the at least one notch filter has a first bandwidth, wherein the undesired feedback has a second bandwidth, and wherein the at least one notch filter is configured so as to center the first bandwidth of the at least one notch filter on the second bandwidth of the undesired feedback (Fig. 1; column 3, lines 32-60; column 4, lines 47-63).

16. Regarding Claim 14, Miller discloses the at least one probe generator has a first bandwidth, wherein the feedback path has a second bandwidth, and wherein the at least one probe generator is configured so as to center the first bandwidth of the at least one probe generator on the second bandwidth of the feedback path (Fig. 1; column 3, lines 32-60; column 4, line 64 to column 5, line 35).

17. Regarding Claim 15, Miller discloses the at least one probe generator generates a plurality of signals that are combined to form a probe signal to probe a feedback path (Fig. 1; column 4, line 64 to column 5, line 35).

18. Regarding Claim 17, Miller discloses a signal processor to provide the processed signal (Fig. 1).

19. Regarding Claim 18, Miller discloses the signal processor includes a compressive amplifier (Fig. 1; column 3, lines 32-60).

20. Regarding Claim 20, Miller discloses a filter adjuster to adjust a filter by providing a set of filter coefficients (Fig. 3; column 7, lines 9-19).

21. Regarding Claim 22, Miller discloses an inhibiting filter receptive to the set of filter coefficients from the filter adjuster to inhibit at least one feedback component of the input signal (Fig. 3; column 7, lines 9-19).

22. Claim 25 is essentially similar to Claim 8 and is rejected for the reasons stated above apropos to Claim 8 (Fig. 1; column 4, line 64 to column 5, line 35).

23. Regarding Claim 28, Miller discloses the signal generator is a sinusoidal generator (Fig. 1; column 4, line 64 to column 5, line 35).

24. Regarding Claim 29, Miller discloses the signal generator is a narrowband noise generator (Fig. 1; column 4, line 64 to column 5, line 35).

25. Regarding Claim 34, Miller discloses the frequency signal is a constant value (Fig. 1; column 4, line 64 to column 5, line 35).

26. Claim 36 is essentially similar to Claims 8, 22, and 25 and is rejected for the reasons stated above apropos to Claims 8, 22, and 25.

27. Regarding Claim 40, Miller discloses a filter adjuster to adjust an inhibiting filter to inhibit the undesired feedback by providing a set of filter coefficients, the filter adjuster comprising: a modeler receptive to a feedback indicator parameter, the input signal, and an output signal to model at least one response of the feedback path when the feedback path is probed with the narrowband subaudible audio probe signal at a predetermined frequency, wherein the modeler provides at least one sample that is representative of the at least one response of the feedback path (Fig. 1; column 4, line 64 to column 5, line 35)

Claim Rejections - 35 USC § 103

28. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

29. Claims 1-7 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6496581 to Finn et al. (hereafter as Finn).

30. Regarding Claim 1, Finn discloses a method of processing audio signals (Fig. 8), comprising inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter (Fig. 8; column 15, lines 17-36) using a narrowband probe signal (400,430). Finn does not expressly the narrowband probe signal being subaudible. However, the Examiner takes Official Notice that it would have been obvious to one having ordinary skill in the art to

have the narrowband probe signal be subaudible in order to reduce undesired signals heard by the user. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to modify Finn to provide a subaudible narrowband probe signal in order to reduce undesired signals heard by the user.

31. Regarding Claim 2, Finn discloses a method of processing at least one audio signal (Fig. 7) comprising: filtering a processed signal by a notch filter to form a filtered signal (column 2, lines 36-53; column 14, line 4 to column 15, line 3).

Finn does not expressly disclose sending a subaudible narrowband signal having a first bandwidth into the filter signal to form a probe signal to probe a feedback path having a second bandwidth.

Finn discloses an acoustic feedback tonal canceler is provided, removing tonal noise from the output of the microphone to prevent broadcast thereof by a remote but acoustically coupled loudspeaker. Feedback tonal canceler (390,420) includes a summer (392,422) having an input (394,424) from microphone (36,38), an input (396,436) from feedback detector (398,428) and tone generator (400,430) supplied through adaptive filter model (402,432) (i.e. sending a narrowband signal having a first bandwidth into the filter signal to form a probe signal to probe a feedback path having a second bandwidth)(Fig. 8), and an output (404,434) to loudspeaker (34,32) through summer (90,106). Model (402,432) has a model input (406,436) from tone generator (400,430), a model output (408,438) supplying a correction signal to summer input (396,426), and an

error input (410,440) from summer output (404,434) (Fig. 8; column 2, lines 54-57; column 15, lines 4-36).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Finn with the teaching of Finn to incorporate an acoustic feedback tonal canceler in order to removing tonal noise from the output of the microphone to prevent broadcast thereof by a remote but acoustically coupled loudspeaker. Therefore, Finn as modified includes a summer (392,422) having an input from the adjustable notch filter (356,376), wherein the adjustable notch filter has filtered the output of the microphone (36,38), an input (396,436) from feedback detector (350,370) and tone generator (400,430) supplied through adaptive filter model (402,432), wherein the feedback detect (350,370) has an input (352,372) from the microphone (36,38), and an output (354,374) controlling the adjustable notch filter (356,376) filtering the output of the microphone (36,38) supplied to loudspeaker (34,32), and an output (404,434) to loudspeaker (34,32) through summer (90,106). Model (402,432) has a model input (406,436) from tone generator (400,430), a model output (408,438) supplying a correction signal to summer input (396,426), and an error input (410,440) from summer output (404,434).

Finn as modified does not expressly the narrowband signal being subaudible. However, the Examiner takes Official Notice that it would have been obvious to one having ordinary skill in the art to have the narrowband signal be subaudible in order to reduce undesired signals heard by the user. Therefore it would have been obvious to one having ordinary skill in the art at the time of the

invention to modify Finn to provide a subaudible narrowband signal in order to reduce undesired signals heard by the user.

32. Regarding Claim 3, Finn as modified comparing the probe signal to an input signal and adjusting selectively an inhibiting filter so as to inhibit at least one audio artifact associated with the feedback path (Fig. 8; column 15, lines 4-16).

33. Regarding Claim 4, Finn as modified discloses turning off selectively the operation of the notch filter when the inhibiting filter is adjusted (column 14, lines 4-49).

34. Regarding Claim 5, Finn as modified discloses sending the subaudible narrowband signal comprises sending the subaudible narrowband signal having a level, wherein the level of the subaudible narrowband signal is determined using an audibility model (i.e. it is inherent the tone generator generates a tone with a level)(Figs. 7 and 8).

35. Regarding Claim 6, Finn as modified does not expressly disclose sending the subaudible narrowband signal comprises sending the subaudible narrowband signal at a level determined by an audibility model, wherein the audibility model has a criterion level, and wherein the level of the subaudible narrowband signal is adjusted so as to be is the criterion level of the audibility model. Finn disclose a training noise to be imperceptible by the occupant yet have a sufficient signal to noise ratio for accurate model convergence (column 2, lines 7-14; column 10, lines 22-38). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Finn as modified with the

teaching of Finn to have the tone generator to generate a tone signal, which have a sufficient signal to noise ratio for accurate model convergence.

36. Regarding Claim 7, Finn as modified discloses wherein sending the subaudible narrowband signal comprises sending the subaudible narrowband signal at a level determined by an audibility model, wherein the audibility model has a criterion level, and wherein the level of the subaudible narrowband signal is adjusted so as to be is below the criterion level of the audibility model (column 10, lines 54-67).

37. Claims 8-23, 25, 28-29, 34, 36, and 40 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 6496581 to Finn in view of U.S. Patent No. 5677987 to Seki et al. (hereafter as Seki).

38. Regarding Claim 8, Finn discloses a system for enhancing audio signals, the system (Fig. 7) comprising: at least one detector to detect undesired feedback in an input signal (350,370); at least one notch filter, wherein the at least one notch filter provides a filtered signal (Fig. 7; column 14, lines 4-67).

Finn does not expressly disclose a processed signal wherein the processed signal is provided by processing the input signal.

Seki discloses a compressor/limiter for limiting the amplitude an input signal in order to avoid damaging equipment such as speaker (Fig. 16; column 4, lines 10-21). Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to incorporate a compressor/limiter for limiting the amplitude the input signal in order to avoid damaging equipment such

as speaker (i.e. a processed signal wherein the processed signal is provided by processing the input signal, therefore the at least one notch filter filters the processed signal).

Finn does not expressly disclose at least one probe generator to generate a probe signal and the filtered signal used to probe a feedback path with a narrowband audio probe signal.

Finn discloses an acoustic feedback tonal canceler is provided, removing tonal noise from the output of the microphone to prevent broadcast thereof by a remote but acoustically coupled loudspeaker. Feedback tonal canceler (390,420) includes a summer (392,422) having an input (394,424) from microphone (36,38), an input (396,436) from feedback detector (398,428) and tone generator (400,430) supplied through adaptive filter model (402,432) (i.e. at least one probe generator to generate a probe signal and the filtered signal used to probe a feedback path with a narrowband audio probe signal)(Fig. 8), and an output (404,434) to loudspeaker (34,32) through summer (90,106). Model (402,432) has a model input (406,436) from tone generator (400,430), a model output (408,438) supplying a correction signal to summer input (396,426), and an error input (410,440) from summer output (404,434) (Fig. 8; column 2, lines 54-57; column 15, lines 4-36).

Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Finn with the teaching of Finn to incorporate an acoustic feedback tonal canceler in order to removing tonal noise from the output of the microphone to prevent broadcast thereof by a remote but

acoustically coupled loudspeaker. Therefore, Finn as modified includes a summer (392,422) having an input from the adjustable notch filter (356,376), wherein the adjustable notch filter has filtered the output of the microphone (36,38), an input (396,436) from feedback detector (350,370) and tone generator (400,430) supplied through adaptive filter model (402,432), wherein the feedback detect (350,370) has an input (352,372) from the microphone (36,38), and an output (354,374) controlling the adjustable notch filter (356,376) filtering the output of the microphone (36,38) supplied to loudspeaker (34,32), and an output (404,434) to loudspeaker (34,32) through summer (90,106). Model (402,432) has a model input (406,436) from tone generator (400,430), a model output (408,438) supplying a correction signal to summer input (396,426), and an error input (410,440) from summer output (404,434).

Finn does not expressly the narrowband audio probe signal being subaudible. However, the Examiner takes Official Notice that it would have been obvious to one having ordinary skill in the art to have the narrowband audio probe signal be subaudible in order to reduce undesired signals heard by the user. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to modify Finn to provide a narrowband audio probe signal be subaudible in order to reduce undesired signals heard by the user.

39. Regarding Claim 9, Finn as modified discloses the at least one detector determines when the feedback path will be probed (column 14, lines 4-49; column 15, lines 4-16).

40. Regarding Claim 10, Finn as modified discloses the at least one detector determines a range of frequencies at which the feedback path will be probed (column 14, lines 4-49; column 15, lines 4-16).

41. Regarding Claim 11, Finn as modified discloses the at least one detector provides a feedback parameter, and wherein the at least one notch filter is receptive to the feedback parameter from the at least one detector (Fig 7; column 14, lines 4-49; column 15, lines 4-16).

42. Regarding Claim 12, Finn as modified discloses the at least one detector provides a plurality of feedback parameters, and wherein the at least one notch filter is receptive to the plurality of feedback parameters from the at least one detector (column 14, lines 4-49).

43. Regarding Claim 13, Finn as modified discloses the at least one notch filter has a first bandwidth, wherein the undesired feedback has a second bandwidth, and wherein the at least one notch filter is configured so as to center the first bandwidth of the at least one notch filter on the second bandwidth of the undesired feedback (Fig. 7; column 14, lines 4-67).

44. Regarding Claim 14, Finn as modified discloses the at least one probe generator has a first bandwidth, wherein the feedback path has a second bandwidth, and wherein the at least one probe generator is configured so as to center the first bandwidth of the at least one probe generator on the second bandwidth of the feedback path (column 15, lines 4-36).

45. Regarding Claim 15, Finn as modified discloses a sine ware or multiple sine waves can be generated (i.e. the at least one probe generator generates a

plurality of signals)(column 15, lines 4-16), but does not expressly disclose the plurality of signals are combined to form a probe signal to probe a feedback path. However, it would have been obvious to one having ordinary skill in the art at the time the invention was made that when multiple sine waves are generated the multiple sine waves would be combined at a summer as taught by Finn in Fig. 5 to produce a probe signal.

46. All elements of Claim 16 are comprehended by Claim 8. Claim 16 is rejected for the reasons stated above apropos to Claim 8.

47. All elements of Claim 17 are comprehended by Claim 8. Claim 17 is rejected for the reasons stated above apropos to Claim 8.

48. All elements of Claim 18 are comprehended by Claim 8. Claim 18 is rejected for the reasons stated above apropos to Claim 8.

49. Regarding Claim 19, Finn as modified discloses once the filter has been applied, the observation of the acoustic feedback should vanish, however hysteresis in the measurement process should be applied to not encourage cycling of the feedback reduction. Long term statistics of the feedback treatment process can be utilized for determining if the notch filter could be removed from the communication channel (column 14, lines 4-49), but does not expressly disclose a switch to provide an output signal, wherein the switch is receptive to the processed signal and a combined signal, wherein the combined signal includes a combination of the probe signal and the filtered signal. However, the Examiner take Official Notice that it would have been obvious to provide a switch to turn on/off the feedback reduction or switch between normal mode and

feedback reduction when the detector determines that it is not necessary for feedback reduction which will remove the notch filter and sine wave or multiple sine waves (i.e. probe signal) from the communication channel when the switch is turned off or in normal mode in order to reduce processing to occur when it is not necessary. Therefore it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify Finn as modified to incorporate a switch to provide the flexible to remove the notch filter and sine wave or multiple sine waves (i.e. probe signal) from the communication channel when the switch is turned off or in normal mode in order to reduce processing to occur when it is not necessary. Therefore, Finn as modified discloses a switch receptive to the processed signal and a combined signal, wherein the combined signal includes a combination of the probe signal and the filtered signal.

50. Regarding Claim 20, Finn as modified discloses a filter adjust a filter by providing a set of filter coefficients (Fig. 8; column 15, lines 4-16).

51. Regarding Claim 21, Finn as modified discloses the filter adjuster is configured to compare the input signal and an output signal to determine amplitude and phase responses of the feedback path, wherein the output signal includes a combination of the probe signal and the filtered signal (column 4, lines 48-67; column 15, lines 4-16).

52. Regarding Claim 22, Finn as modified discloses an inhibiting filter receptive to the set of filter coefficients from the filter adjuster to inhibit at least one feedback component of the input signal (column 15, lines 4-14)

53. Regarding Claim 23, Finn as modified discloses the inhibiting filter approximates the response of the feedback path to provide at least one feedback component signal, wherein the at least one feedback component signal is subtracted from the input signal (Figs. 7 and 8).

54. Claim 25 is essentially similar to Claim 8 and is rejected for the reasons stated above apropos to Claim 8 (Figs. 7 and 8; column 15, lines 4-36).

55. Regarding Claim 28, Finn as modified discloses the signal generator is a sinusoidal generator (Fig. 8; column 15, lines 4-16).

56. Regarding Claim 29, Finn as modified discloses the signal generator is a narrowband noise generator (Fig. 8; column 15, lines 4-16).

57. Regarding Claim 34, Finn as modified discloses the frequency signal is a constant value (Fig. 8; column 15, lines 4-16).

58. Claim 36 is essentially similar to Claims 8, 22, and 25 and is rejected for the reasons stated above apropos to Claims 8, 22, and 25.

59. Regarding Claim 40, Finn as modified discloses a filter adjuster to adjust an inhibiting filter to inhibit the undesired feedback by providing a set of filter coefficients, the filter adjuster comprising: a modeler receptive to a feedback indicator parameter, the input signal, and an output signal to model at least one response of the feedback path when the feedback path is probed with the narrowband subaudible audio probe signal at a predetermined frequency, wherein the modeler provides at least one sample that is representative of the at least one response of the feedback path (Figs. 7 and 8; column 15, lines 4-36)

60. Claim 1 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent Application Publication No. 20020044667 to Stott et al. (hereafter as Stott).

61. Regarding Claim 1, Stott discloses a method of processing audio signals (Fig. 7), comprising inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter (Fig. 7; page 3, paragraph 0047-0053) using a narrowband probe signal (70)(abstract; Fig. 7). Stott does not expressly the narrowband probe signal being subaudible. However, the Examiner takes Official Notice that it would have been obvious to one having ordinary skill in the art to have the narrowband probe signal be subaudible in order to reduce undesired signals heard by the user. Therefore it would have been obvious to one having ordinary skill in the art at the time of the invention to modify Stott to provide a subaudible narrowband probe signal in order to reduce undesired signals heard by the user.

Allowable Subject Matter

62. Claims 24, 41-45, and 47-50 are allowed.

63. Claims 26-27, 30-33, 35, 37-39 and 46 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Response to Arguments

64. Applicant's arguments filed 8/09/2006 have been fully considered but they are not persuasive.

65. With respect to Applicant's argument on page 13, stating that "Applicant respectfully disagrees with this analysis. Applicant submits that a signal input to a filter that then provides a modified version of that signal does not disclose, teach, or suggest using a signal to adjust the filter itself", has been noted. However, the examiner respectfully disagrees. The filter 120 of Kandel operates in a similar manner to the filter adjuster 124 and inhibiting filter 134 disclosed in the application, wherein the signal generated by the inhibiting filter 134 is subtracted from the input signal 102, which the signal from filter 120 of Kandel operated in a similar manner to be subtracted from the input 112. Therefore Kandel meets the limitation disclosed in Claim 1.

With respect to Applicant's argument on page 15, stating that "Applicant cannot find in Miller a disclosure, a teaching, or a suggestion of a method in which a feedback-inhibiting filter is adjusted using a narrowband subaudible probe signal, as recited in claim 1. In the Office Action, it is stated that "Miller discloses a method of processing audio signals, comprising inhibiting at least one feedback component of an input audio signal by adjusting a feed back-inhibiting filter (Fig. 3; column 7, lines 9-19) using a narrowband subaudible probe signal (Fig. 1; column 4, line 64 to column 5, line 35)." Regarding Figure 3 at column 7, lines, 12-16, Miller recites:

> The feedback eliminator 62 monitors the program signal from the mixer 24, identifies any frequencies which become loud because of acoustic

feedback, and attenuates identified howl frequencies to eliminate the acoustic feedback.

Applicant cannot find in Miller a teaching or suggest that feedback eliminator 62 is adjusted using a signal. Applicant submits that a filter or "feedback eliminator" operating on a signal does not disclose, teach, or suggest a signal adjusting a filter. Therefore, Applicant submits that Miller does not teach each and every claim element of claim 1 and that Miller does not teach the identical invention in as complete detail as is contained in claim 1. Thus, Applicant submits that Miller does not anticipate claim 1 and that claim 1 is patentable over Miller for at least the reasons stated above", has been noted. However, the examiner respectfully disagrees. Claim 1 recites "a method of processing audio signals, comprising inhibiting at least one feedback component of an input audio signal by adjusting a feed back-inhibiting filter using a narrowband subaudible probe signal", but does not clearly discloses in the claim how the narrowband subaudible probe signal is utilize to inhibit at least one feedback component, which the examiner can broadly interpret the limitation in any manner consistent with the limitation. Miller discloses the incoming program signal may be monitored for magnitude of a broadcast reference signal within an appropriate time window and/or compared to the frequency component magnitude before and/or after broadcast of the reference signal. Where the amplification system includes program material input from microphones, acoustic feedback of the broadcast reference signal can effect the overall transfer response. **Monitoring the incoming program signal for acoustic feedback of the reference signal in the program signal enables**

the automatic equalizer to make an appropriate adjustment when necessary. The feedback eliminator 62 is a unit, circuit, or algorithm which eliminates unwanted acoustic feedback, sometimes called howl. An example of a suitable feedback eliminator is disclosed in U.S. Pat. No. 5,245,665. The feedback eliminator 62 monitors the program signal from the mixer 24, identifies any frequencies which become loud because of acoustic feedback, and attenuates identified howl frequencies to eliminate the acoustic feedback. **When the automatic equalizer is digital, both equalizer 20 and feedback eliminator 62 can be formed by algorithm(s) in the same microprocessor or DSP.** It is implicit that the narrowband reference signals generated in automatic equalizer is provided to the input of the feedback eliminator, as shown in Fig. 3, which the signals from the feedback eliminator is fed to power amplifiers in which speakers 36 broadcast the signal from power amplifiers 34. A microphone 40 to pick up the audio program, wherein the signal from the microphone is utilizes to make adjustments in the automatic equalizer. See Figs. 1 and 3; column 6, line 29 to column 7, line 20; column 11, lines 12-37.

66. With respect to Applicant's argument on page 16, stating that "Applicant cannot find in Miller a disclosure, a teaching, or a suggestion of a method that includes forming a probe signal to probe a feedback path, as recited in claim 2. In the Office Action, it is stated that "Miller discloses a method of processing at least one audio signal comprising: filtering a processed signal by a notch filter to form a filtered signal (Fig. 1; column 4, lines 47-63); and sending a subaudible narrowband signal having a first bandwidth into the filter signal to form a probe

signal to probe a feedback path having a second bandwidth (Fig. 1; column 4, line 64 to column 5, line 35)." Applicant disagrees. From Miller's Figure 1, Applicant submits that Miller does not disclose, teach, or suggest probing a feedback path. Miller has "inputs from one or more program signal generators such as musical instrument 26, microphone 28, and/or recorded material player 30" and audio pickup at "reference microphone 40" (See, Miller, Figure 1 and column 3, lines 38-49). As shown in Miller's Figure 1, Miller's system is applied to the signal received at "reference microphone 40." Since "reference microphone 40" is different from "musical instrument 26, microphone 28, and/or recorded material player 30," Applicant submits that a test signal at the input to "reference microphone 40 is not a probe of a feedback path. Therefore, Applicant submits that Miller does not disclose, teach, or suggest sending a subaudible narrowband signal into a filtered signal to form a probe signal to probe a feedback path as recited in claim 2. Thus, Applicant submits that Miller does not teach each and every claim element of claim 2 and that Miller does not teach the identical invention in as complete detail as is contained in claim 2. Thus, Applicant submits that Miller does not anticipate claim 2 and that claim 2 is patentable over Miller for at least the reasons stated herein", has been noted. However, the examiner respectfully disagrees. See argument above.

67. With respect to Applicant's argument on page 16, stating that "Applicant cannot find in Miller a disclosure, a teaching, or a suggestion of a system having a detector to detect undesired feedback in an input signal and a notch filter to filter a processed signal, wherein the notch filter provides a filtered signal and the

processed signal is provided by processing the input signal, as recited in claim 8. In the Office Action, it is stated that

> Regarding Claim 8, Miller discloses a system for enhancing audio signals, the system comprising; at least one detector to detect undesired feedback in an input signal (Fig. 1; column 3, lines 32-60); at least one notch filter to filter a processed signal, wherein the at least one notch filter provides a filtered signal (Fig. 1; column 4, lines 47-63) and the processed signal is provided by processing the input signal (Fig. 1); and at least one probe generator to generate a probe signal, the probe signal and the filtered signal used to probe a feedback path with a narrowband subaudible audio probe signal (Fig. 1; column 4, line 64 to column 5, line 35). From Miller's Figure 1, "sine wave detector 42" has an input from "microphone 40" and "narrow band reject filter 21" has an input processed from "musical instrument 26, microphone 28, and/or recorded material player 30."

From Miller's Figure 1, the input related to detector 42 is different form the input related to filter 21. In contrast, the recited detector and notch filter are related to the same input in claim 8. Thus, Applicant submits that the features of Miller's system are not configured as the features recited in claim 8 of the instant application. Hence, Miller does not disclose the presence of each and every element of the claim 8 as arranged as in claim 8. Thus, Applicant submits that Miller does not anticipate claim 8 and that claim 8 is patentable over Miller for at least the reasons stated herein", has been noted. However, the examiner

respectfully disagrees. Miller does discloses a system having a detector to detect undesired feedback in an input signal and a notch filter to filter a processed signal, wherein the notch filter provides a filtered signal and the processed signal is provided by processing the input signal, see Figs. 1 and 3-4; column 6, lines 30-61.

68. With respect to Applicant's argument on page 18, stating that "Applicant cannot find in Finn, as proffered in the Office Action, a teaching or a suggestion of a method that includes inhibiting at least one feedback component of an input audio signal by adjusting a feedback-inhibiting filter using a narrowband subaudible probe signal as recited in claim 1. In the Office Action, it is stated that "Finn does not expressly the narrowband probe signal being subaudible." Further, in the Office Action, it is stated that "the Examiner takes Official Notice that it would have been obvious to one having ordinary skill in the art to have the narrowband probe signal be subaudible in order to reduce undesired signals heard by the user." Pursuant to M.P.E.P. § 2144.03, Applicant respectfully traverses the assertion of Official Notice and requests that the Examiner cite references in support of the Examiner's position in relation to Finn taken as a whole. Absent a reference, the Examiner is respectfully requested to submit an affidavit as required by 37 C.F.R. § 1.104(d)(2), M.P.E.P. 2144.03. Finn relates to apparatus to remove undesired signals prior to input to a speaker. See Finn column 4, lines 50-53 and column 15, lines 17-19. If Finn teaches that his apparatus removes undesired signals prior to input to a speaker, then the user will not hear such undesired signals. Thus, there is no basis provided in Finn or

in the Office Action for the Official Notice", has been noted. However, the examiner respectfully disagrees. USPN 5506910 to Miller et al. for example, discloses a narrow band short duration low magnitude tones inserted into program signals being broadcast without distorting or producing any noticeable effect on the broadcast program (Figs. 1 and 3-4; column 2, lines 46-58). USPN 6594365 to Eatwell for example, discloses a psycho-acoustical model is used to calculate a spectral masking threshold, below which added noise is substantially inaudible (Figs. 2). USPN 6347148 to Brennan et al. for example, discloses a noise source is passed through a shaping filter, which is controlled with the control signal, to generated frequency-shaped noise, which is inaudible to someone hearing the output (abstract; Fig. 1). Furthermore, the system of Finn operates in a similar manner to Applicant's invention to suppression feedback of the input signal.

69. With respect to Applicant's argument on page 19, stating that "Applicant cannot find in the above quote from Finn referenced in the Office Action a teaching or a suggestion of a narrowband probe signal. Applicant submits that using tone generators (400, 430) in Finn does not teach or suggest using a narrowband tone signal. Therefore, Applicant submits that Finn does not teach or suggest using a subaudible signal or using a narrowband subaudible signal. Thus, Applicant submits that Finn does not teach or suggest all the elements of claim 1 and that claim 1 is patentable over Finn", has been noted. However, the examiner respectfully disagrees. It is implicit that the tone generator of Finn as

modified generates a narrowband tone signal, therefore Finn as modified discloses using a narrowband tone signal.

70. With respect to Applicant's argument on page 19, stating that "Applicant cannot find in Finn, as proffered in the Office Action, a teaching or a suggestion of a method that includes sending a subaudible narrowband signal having a first bandwidth into a filtered signal to form a probe signal to probe a feedback path as recited in claim 2. In addition to the lack of teaching or suggestion in Finn with respect to a subaudible narrowband signal, Applicant cannot find a teaching or a suggestion in Finn with respect to forming a probe signal to probe a feedback path. In Figure 8, the feedback detector provides input to tone generator 400, where the output of tone generator 400 is provided to model 402, whose output is summed with signals from other models to remove to tonal feedback noise to prevent broadcast of the tonal noise by the loudspeaker 34. Finn appears to remove detected feedback without probing the feedback path. As a result of the void in Finn regarding probing a feedback path, Applicant submits that Finn does not form a probe signal to probe a feedback path and further that Finn does not teach or suggest forming a probe signal as recited in claim 2", has been noted. However, the examiner respectfully disagrees. Finn as modified discloses tone generator which provides a narrowband tone signal, which it is implicit that the narrowband tone signal has a first bandwidth, wherein the narrowband tone signal is send into a filtered signal, see Fig. 8. In addition, see argument above.

71. In response to applicant's argument on page 20, that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must

be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

72. With respect to Applicant's argument on page 21, stating that "Applicant cannot find in the combination of Finn and Seki et al. (hereafter Seki), as proffered in the Office Action, a teaching or a suggestion of a system that includes a probe generator to generate a probe signal such the system is configured to use the probe signal and a filtered signal to probe a feedback path with a narrowband subaudible audio probe signal, as recited in claim 8. In the Office Action, it is stated that "Finn does not expressly disclose at least one probe generator to generator a probe signal and the filtered signal used to probe a feedback path with a narrowband audio probe signal." Applicant submits that not only does Finn fail to disclose a system configured to "probe a feedback path with a narrowband audio probe signal," but Finn is void of a teaching of a system configured to probe a feedback path with a signal. Applicant cannot find a teaching or a suggestion in Finn with respect to forming a probe signal to probe a feedback path. In Figure 8, the feedback detector provides input to tone generator 400, where the output of tone generator 400 is provided to model 402, whose output is summed with signals from other models to remove to tonal feedback noise to prevent broadcast of the tonal noise by the loudspeaker 34.

Finn appears to remove detected feedback without probing the feedback path. Also in Figure 7, Finn appears to remove detected feedback without probing the feedback path. In the Office Action, Seki is cited with respect to a "compressor/limiter" to process an input signal. Application submits that the teaching of Seki regarding a "compressor/limiter" does not cure the abovementioned deficiencies of applying Finn to claim 8. Thus, Applicant submits that the combination of Finn and Seki does not teach or disclose a system configured to probe a feedback path with a signal as recited in claim 8", has been noted. However, the examiner respectfully disagrees. See argument above.

73. In response to applicant's argument on page 21, that the examiner's conclusion of obviousness is based upon improper hindsight reasoning, it must be recognized that any judgment on obviousness is in a sense necessarily a reconstruction based upon hindsight reasoning. But so long as it takes into account only knowledge which was within the level of ordinary skill at the time the claimed invention was made, and does not include knowledge gleaned only from the applicant's disclosure, such a reconstruction is proper. See *In re McLaughlin*, 443 F.2d 1392, 170 USPQ 209 (CCPA 1971).

74. With respect to Applicant's argument on page 23, stating that "Applicant cannot find in Stott a disclosure, a teaching, or a suggestion of a method in which a feedback-inhibiting filter is adjusted using a narrowband subaudible probe signal, as recited in claim 1. In the Office Action, it is stated that "Stott discloses a method.., adjusting a feedback-inhibiting filter (Fig. 7; page 3; paragraph 0047-0053) using a narrowband probe signal (70)(abstract; Fig. 7)." Applicant

disagrees. In the Abstract, Stott recites that the "the signal having an auto-correlation function which is substantially a delta function may be an added noise signal (70) or may be constituted by the signal being processed itself." Applicant submits that a signal having substantially a delta function as an auto-correlation function does not teach or suggest that the signal is narrowband. Therefore, Applicant submits that Stott does not teach or suggest all the elements of claim 1 and claim 1 is patentable over Stott", has been noted. However, the examiner respect disagrees. It is implicit that the delta function, also referred to as unit impulse function of Stott is narrowband probe signal.

Conclusion

75. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

76. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Corey P. Chau whose telephone number is (571)272-7514. The examiner can normally be reached on Monday - Friday 9:00 am - 5:00 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chin Vivian can be reached on (571)272-7848. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

VIVIAN CHIN
SUPERVISORY PATENT EXAMINER
TECHNOLOGY CENTER 2600

November 13, 2006
CPC